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SUPPLEMENTARY INFORMATION

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Evidence for a Vast Prograde Stellar Stream in the Solar Vicinity

Supplementary Information

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This analysis makes use of *emcee* [1] and Extreme Deconvolution [2] for the Gaussian Mixture model.

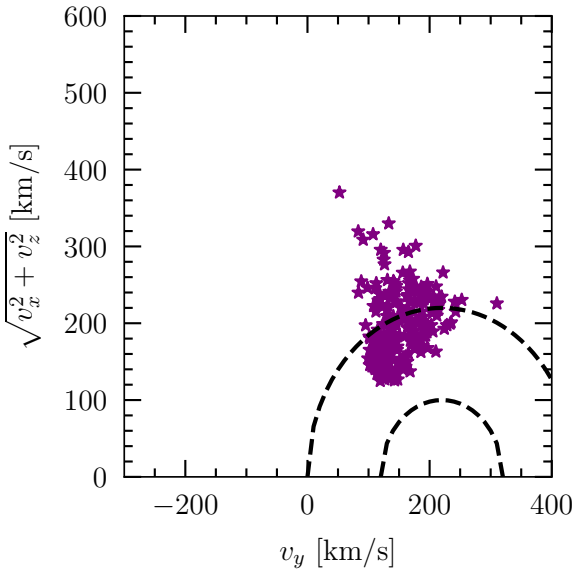

FIG. 1: **Toomre diagram for Nyx stars.** For reference, the black dashed lines correspond to velocity contours of 100 and 220 km/s in the local frame.

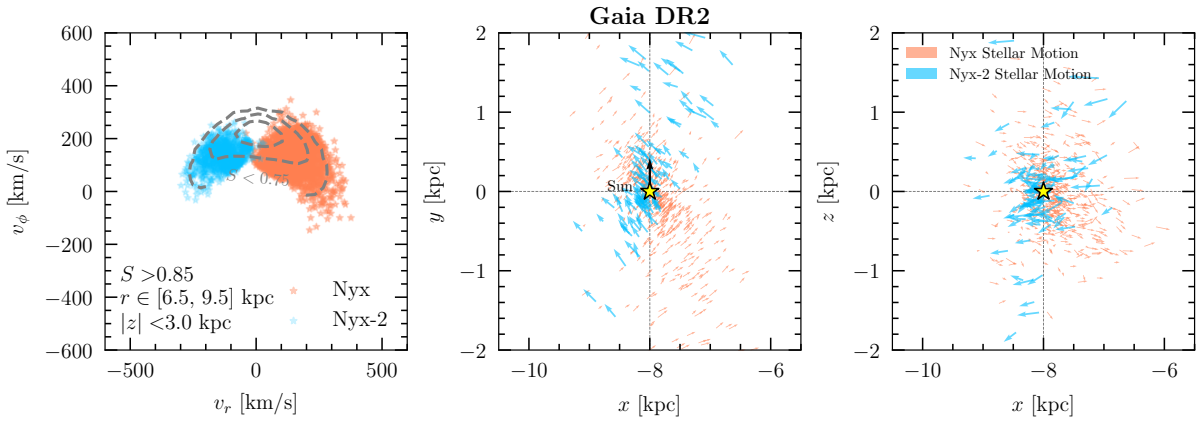

FIG. 2: **Dynamics of the Nyx and Nyx-2 stars. This figure is similar to Fig. 1,** but for stars satisfying a network score cut of $S > 0.85$. In this case, we identify an additional group of stars, labeled Nyx-2, that may be related to the Nyx stream. Details of the clustering algorithm used to find Nyx and Nyx-2 are provided in Paper I. (Left) Plot of the velocities of Nyx and Nyx-2 stars, in the Galactocentric spherical $v_r - v_\phi$ plane. (Middle/Right) Velocity of Nyx and Nyx-2 stars in the $x - y$ and $x - z$ planes, where $x - y$ is the disk plane, and z is perpendicular to the disk. Like Nyx, Nyx-2 is prograde and radial. Its stars move away from the Galactic Center, rather than towards, suggesting that it may be debris from a separate passage of the same satellite galaxy.

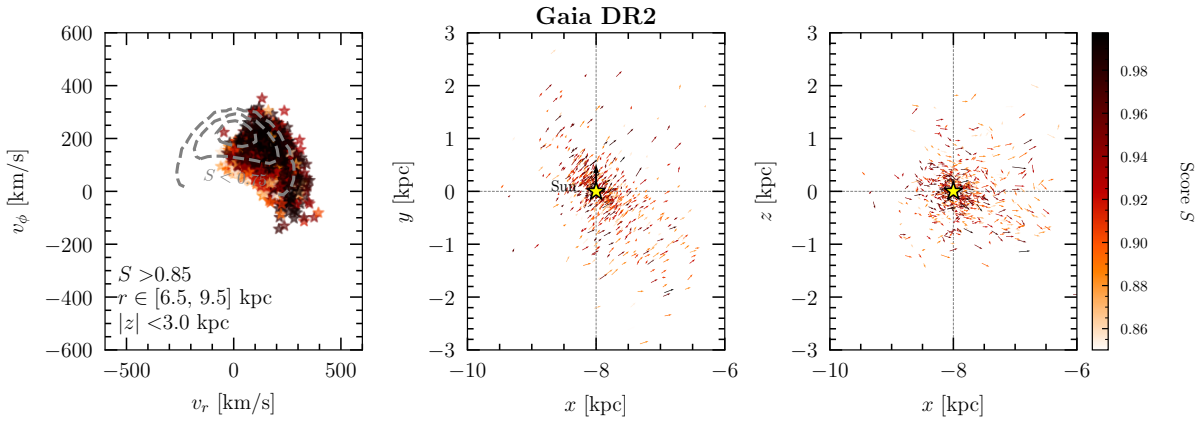

FIG. 3: **Network score dependence of the Nyx stars. This figure is similar to Fig. 1,** but for the Nyx stars in the $S > 0.85$ sample. Stars are colored by their neural network score.

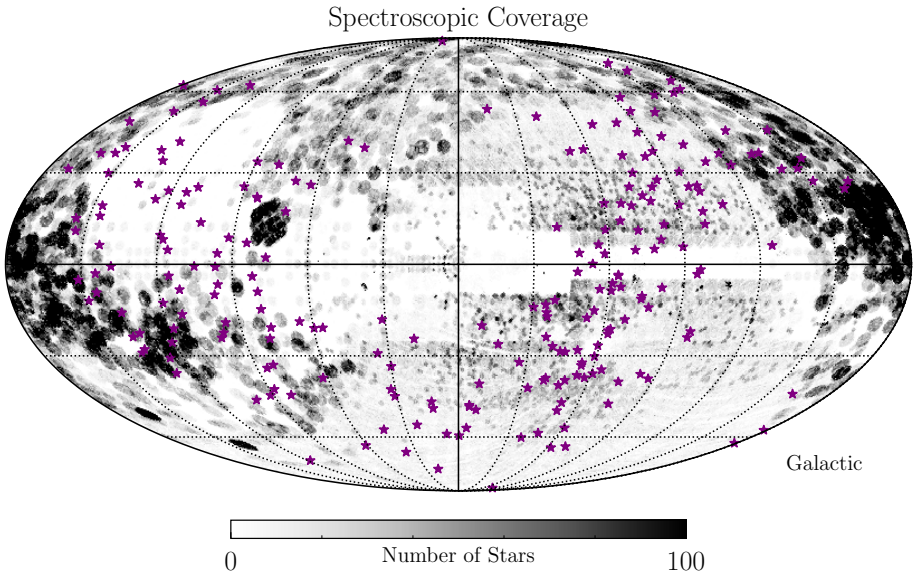

FIG. 4: **Skymap of the Nyx stars. This figure compares** Nyx (purple stars) to the footprint of current spectroscopic surveys (gray) using data from [3]. The colorbar indicates the number of stars, which we saturate at 100 for clarity. Nyx has the greatest overlap with the RAVE-ON catalog [4].

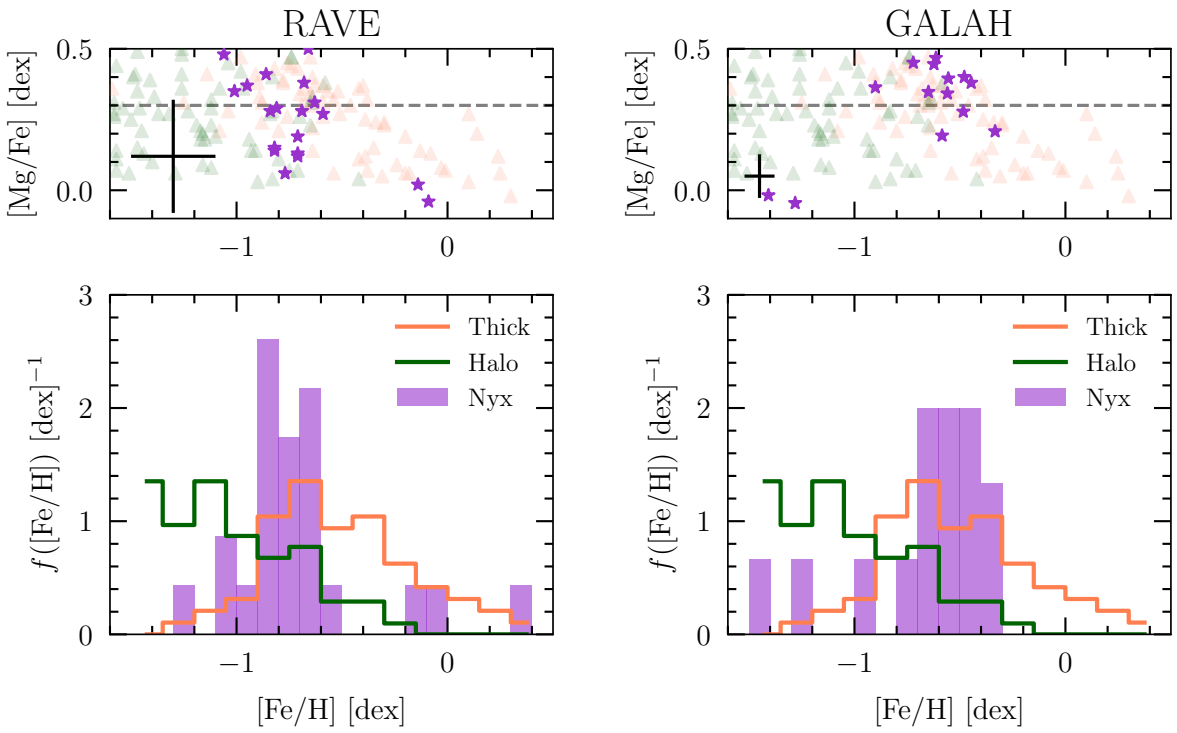

FIG. 5: **Chemical abundance of the Nyx stars. This figure is similar to Fig. 2**, but with abundances from RAVE [5] (left) and GALAH [6] (right), rather than RAVE-ON. The error bars are the 1-sigma uncertainties of the surveys.

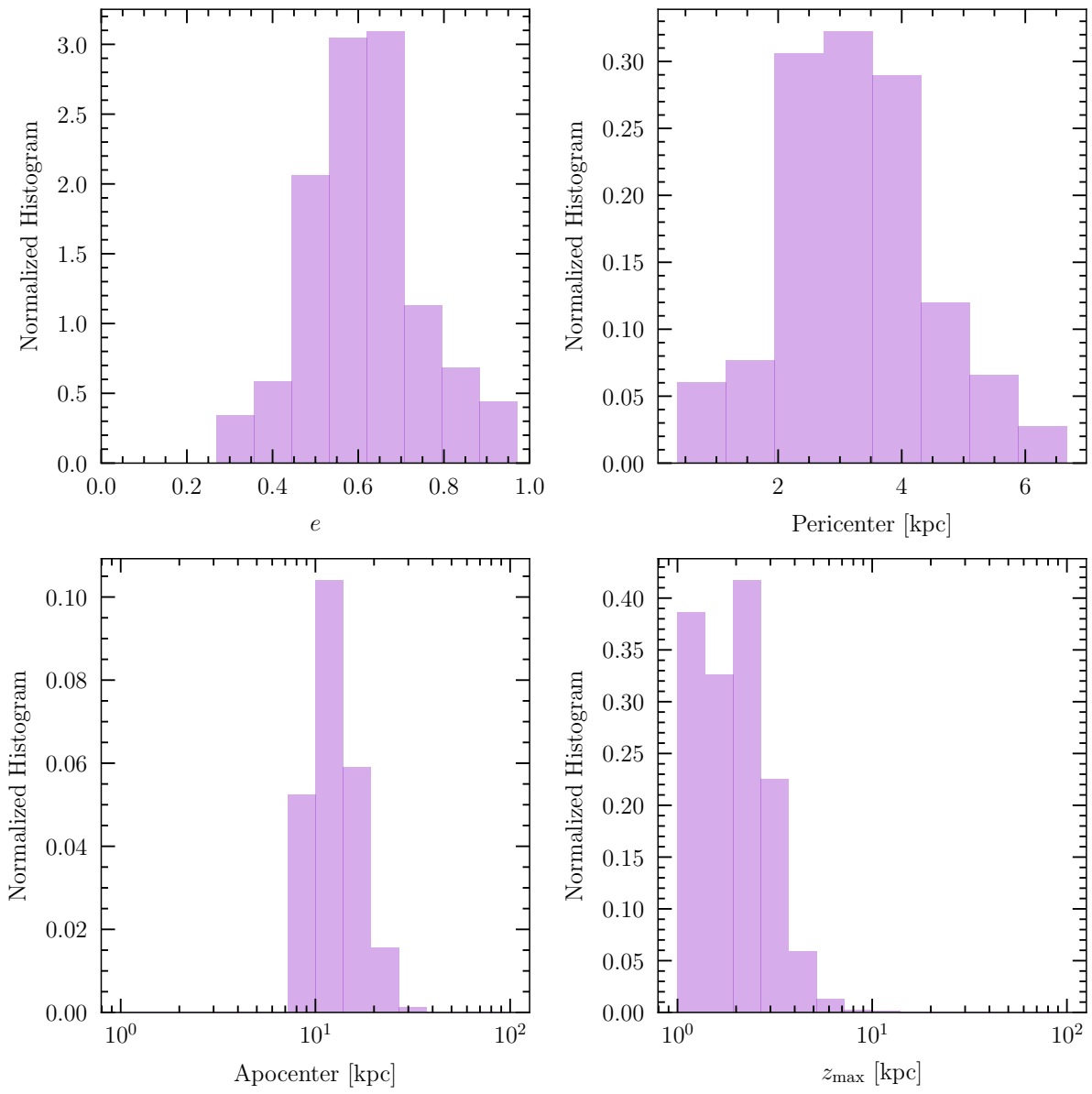

FIG. 6: **Orbital parameters of the Nyx stars.** The distribution of eccentricities (top left), pericenters (top right), apocenters (bottom left), and maximum vertical distance, $z_{\rm max}$, from the Galactic plane (bottom right) for the Nyx stars. These parameters were obtained running the orbits of Nyx stars backwards in time over a period of 1 Gyr using the `gala` package [7] and the Milky Way potential of [8].

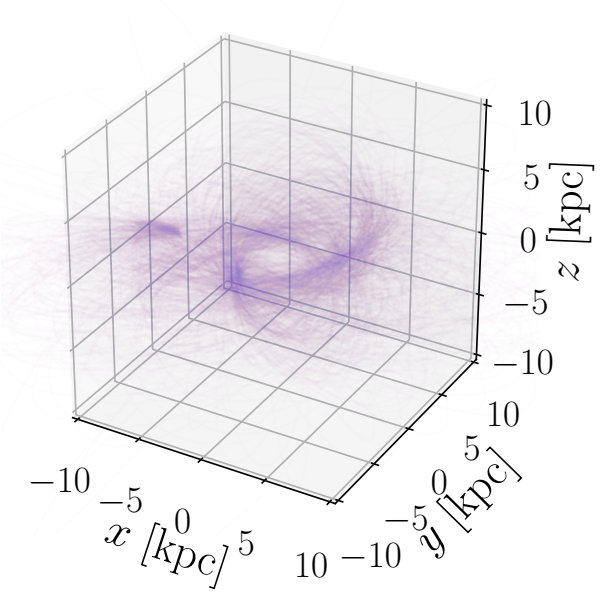

FIG. 7: **The orbits of the Nyx stars. These are obtained by integrating** back by 1 Gyr using the `gala` package [7] and assuming the Milky Way potential of [8].

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